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A SYNOPSIS OF THE SEED-FEEDING GENUS *BEPHRATELLOIDES* (CHALCIDOIDEA: EURYTOMIDAE)

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Abstract.—Species of *Bephratelloides* are phytophagous in seeds of *Annona*. Species included in the genus are: *cubensis* (Ashmead), *paraguayensis* (Crawford), *pomorum* (Fabricius) (n. comb. from *Chalcis*), and ***petiolatus*** Grissell and Schauff (new species); *B. maculicollis* (Cameron) is synonymized under *pomorum*; unrecognized species are *limai* (Bondar) and *melleus* (Westwood) (n. comb. from *Eurytoma*) whose types are lost. Six species previously placed in this genus are removed to other eurytomid genera as follows: *Bephrata consobrina* Girault becomes *Bephratoides consobrinus* (Girault) (n. comb.) (with *Bephratoides longigaster* Subba Rao a new synonym); *Bephrata fulviscapus* Girault and *Bephrata bicolor* Girault are transferred to *Eurytoma* (n. combs.) (*Eurytoma bicolor* (Girault) is renamed *giraulti* Grissell and Schauff to avoid homonomy with *Eurytoma bicolor* Walsh); *Bephrata aristidae* Risbec, *Bephrata decaryi* Risbec, and *Bephrata tananarivensis* Risbec are all transferred to the genus *Tetramesa*. An illustrated key is given to the valid species of *Bephratelloides* and all known host and distribution data are summarized.

Key Words: phytophagous, *Annona*, chalcidoidea, Eurytomidae

Bephratelloides is a genus of Neotropical wasps that are phytophagous in seeds of the genus *Annona* from which they emerge and damage ripening fruit. Species of *Bephratelloides* have been reported from Africa (Burks 1971), but we remove them to other genera as explained below. Several species of *Annona* grow naturally in Africa (Palmer and Pitman 1972), so it is possible that *Bephratelloides* occurs there either naturally or as introductions. There is, however, no current evidence that these wasps occur in Africa.

In the Nearctic, *Annona glabra* L. occurs in the southern tip of Florida. *Bephratelloides cubensis* (Ashmead) was reported from this area in the early 1920's (Bruner and Acuna 1923), where it was reared from exotic annonas. According to Hannah Nadel (pers. comm.) *Annona glabra* serves as a host for *Bephratelloides cubensis* but only around plantings of exotic annonas. We believe, therefore, that *Bephratelloides* occurs in the Nearctic as the result of introductions of exotic annonas. Recently the genus has been introduced into new *Annona*-growing areas in Hawaii (Heu 1988), and it might be expected that as more *Annona* is grown commercially there will be more introductions of *Bephratelloides*.

We undertook this study of *Bephratelloides* because of its great economic importance to *Annona* fruit production, because of the recent movement and introduction of these pest species by man, and because the generic placement and specific identity of almost all of the known species was uncertain. No revision of the genus has been previously undertaken.

The known hosts of the genus include 7

species of *Annona* and a commercial hybrid as follows (common names in parentheses): *Annona cherimola* Miller (cherimoya, custard apple), *A. reticulata* Linnaeus (custard apple, bullock's heart, cherimoya), *A. montana* MacFadden (mountain soursop), *A. muricata* Linnaeus (soursop, guanabana, prickly custard apple), *A. squamosa* Linnaeus (sugar apple, custard apple, sweetsop, anon), *A. squamosa* × *cherimola* (atemoya, a commercial cultivar), *A. bullata* A. Richard (unconfirmed), and *A. glabra* Linnaeus (pond apple, alligator apple).

The following abbreviations are used for institutions in the text: ANSP = Academy of Natural Sciences, Philadelphia; BMNH = British Museum (Natural History), London; USNM = U.S. National Museum of Natural History, Washington, D.C.; MNHN = Museum National D'Histoire Naturelle, Paris; ZM = Zoologisk Museum, Copenhagen; ZMHB = Zoologisches museum, Humboldt Universitat, Berlin.

Bephratelloides Girault

Bephrata: of authors, *nec Bephrata* Cameron, 1884: 109.

Bephratoides Girault, 1913a: 60. Preocc. by *Bephratoides* Brues, 1908: 158. Type species: *Bephrata paraguayensis* Crawford, monotypic and orig. desig.

Bephratelloides Girault, 1913b: 459. New name for *Bephratoides* Girault, 1913a.

Burks (1971) redefined *Bephratelloides* and *Bephrata* based upon the type species of each. *Bephrata* was left with only the type species (*Bephrata ruficollis* Cameron) and a statement was made (Burks 1971: 26) that other species of *Bephrata* should be placed in *Bephratelloides* which contained the "phytophagous eurytomids that develop in the seeds of *Annona*." At the time he could not examine each transferred species to determine if its placement was correct, and the result was the creation of two geographically divergent groups of species: one group of 3 from the Ethiopian Region (Risbec 1951, 1952), and another of 7 from the Neotropical Region (DeSantis 1979, 1980). Where biologies were known, one Ethiopian species caused galls on grass stems, and three neotropical species were phytophagous in seeds of *Annona*. Obviously at least one of the Ethiopian species did not fit the "biological definition" proposed for the genus by Burks (1971).

We examined the 10 species referred to above as well as two additional species in other genera, and our findings considerably alter the composition of the genus. All 3 Ethiopian species as well as 3 neotropical species are transferred to other genera. We synonymize one species, transfer two others into *Bephratelloides*, and describe a new species reared from *Annona* seeds from South America. The type material of two species is lost, and we treat them as unrecognized.

Morphological and biological concepts of *Bephratelloides* are now as Burks defined them in 1971. The genus is confined exclusively to the Neotropical Region (except where moved by man) and is the only eurytomid that feeds on fruits of *Annona*. Morphologically it is separable from the large and poorly defined genus *Eurytoma* only in the configuration of the antenna which appears to have 6 flagellomeres and a solid or 2-segmented club. In *Eurytoma* the antenna has 5 flagellomeres and a 3-segmented club.

Key to Species of *Bephratelloides*

1. Scutellum dorsally depressed in profile, projecting noticeably beyond dorsellum (Fig. 3), apex elongated and excised to some extent (Fig. 12); entire propodeum more or less evenly sculptured with setigerous cells (alveoli) (Fig. 5); (size range from 5.5–9.0 mm, large specimens with darkened area under front wing veins) ..... *pomorum* (Fabricius)

– Scutellum evenly arched in profile, scarcely projecting beyond dorsellum (Fig. 4), apex rounded and not excised (Fig. 11); median propodeum sculptured differently than lateral areas, either without alveoli (Fig. 6), or if present, without setae along midline 2

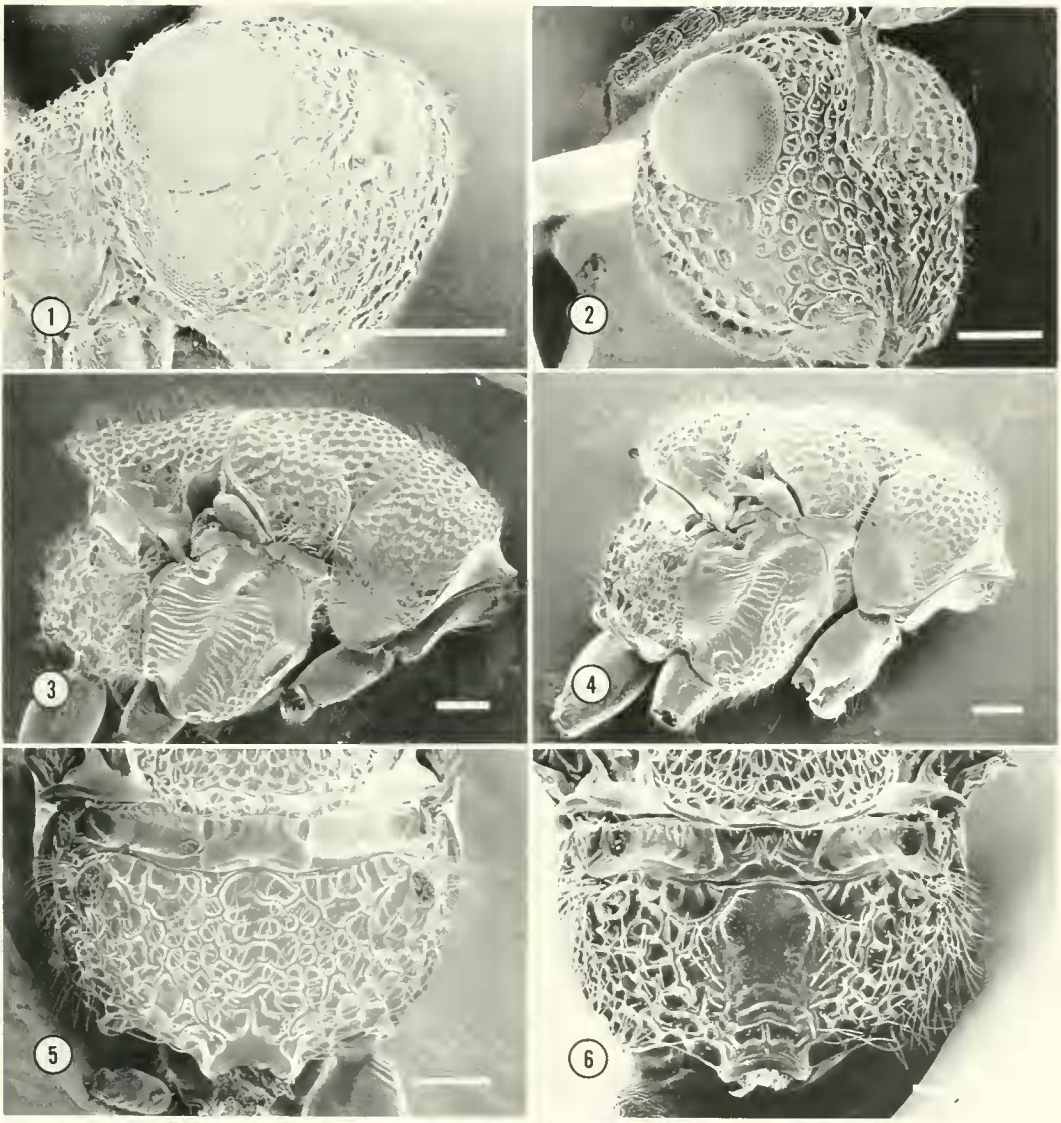

Plate 1. Figs. 1–6. *Bephratelloides* spp. (all ♀), scanning electron micrographs. 1, *petiolatus* head (uncoated). 2, *paraguayensis* head. 3, *pomorum* thorax, lateral view. 4, *cubensis* thorax, lateral view. 5, *pomorum* propodeum. 6, *cubensis* propodeum. Scale line equals 0.25 mm.

2. Median propodeum lacking distinct carinae at least in upper half, nearly smooth (Fig. 6); (size ranges from 4.0–9.5 mm, body color either dark or a mix of orange-yellow with dark markings, large specimens generally with darkened area under wing veins) . . . . . *cubensis* (Ashmead)
– Median propodeum with distinct transverse carinae or cells; (size generally under 5 mm, body color all yellowish, occasionally with dark markings on dorsum, wing posteriad to marginal vein either hyaline or with faint stain; Figs. 13, 14) 3
3. Setigerous punctures nearly contiguous under eye (Fig. 2); forewing speculum absent (i.e. area densely setose), cubital vein with setae basally (Fig. 13); male flagellomeres evenly covered with recurved setae (Fig. 9), abdominal petiole 1.5 × as long as wide . *paraguayensis* (Crawford)

Malar space without setigerous punctures (Fig. 1); forewing speculum present (i.e. area bare), cubital vein without setae basally (Fig. 14); male flagellomeres with erect setae arranged more or less in rows (Fig. 10), abdominal petiole 3 × as long as wide .. *petiolatus* Grissell and Schauff

Bephratelloides pomorum (Fabricius), New Combination
(Figs. 3, 5, 8, 12)

Chalcis pomorum Fabricius 1804: 163, ♀. Holotype ♀, ZM [examined].

Bephrata maculicollis Cameron 1913: 121, 1 ♀, "Br. Guiana." Lectotype ♀ (present designation), BMNH, Type Hym 5.78 [examined]. New Synonymy.

Diagnosis.—Female length 5.5 to 9.8 mm. Body color orangish yellow to black, yellowish specimens with at least some black or dark brown spots on the dorsal thorax, forewings usually with conspicuous markings posteriad of veins; scutellum medially depressed, projecting notably beyond dorsellum (Fig. 3), apical margin elongate and slightly to greatly excised (Fig. 12); propodeum (Fig. 5) more or less evenly sculptured with distinct setigerous cells; forewing speculum absent, cubital vein with setae basally. Male flagellomeres cylindrical (Fig. 8), evenly covered with closely spaced bristles which are subequal to segment width or shorter.

This species is easily confused with *cubensis*, which has about the same variation in size and coloration. However, the scutellum of *cubensis* is rounded apically (Fig. 11), is arched in profile and does not project much beyond the dorsellum (Fig. 4), and the median propodeum (Fig. 6) is either smooth (especially anteriorly) or has a few irregular transverse carinae, but no setae.

Discussion.—Z. Boucek (pers. comm.) pointed out to us that *Chalcis pomorum* is a species of *Bephratelloides* and a senior synonym of *maculicollis*. We acknowledge his generosity in allowing us to publish this synonymy as part of our study.

Withing a single rearing, specimens tend to be about the same size, but different rearings result in a range of sizes from about 5 to 10 mm. Smaller specimens may be noticeably different in habitus than large ones. In small specimens the dorsum of the abdomen is nearly horizontal in profile whereas in larger ones the dorsum is arched. Also the apex of the scutellum is somewhat less concave in smaller specimens and the darkened areas of the front wing, under the venation, tend to disappear. Dissection of genitalia revealed no structural differences which might account for the external appearance of the abdomen, and extremes in scutellar development are bridged by intermediate states.

Dominguez Gil (1980) briefly discussed the impact of *cubensis* (cited as *maculicollis*) on *Annona muricata* in the state of Zulia, Venezuela.

Distribution.—We have seen 126 ♀ and 46 ♂ from the following localities: Honduras, Costa Rica, Panama, Trinidad, Tobago, Colombia, Venezuela, Ecuador, Peru, Bolivia, Belize, Surinam, French Guiana, and Brazil.

Hosts.—*Annona cherimola, Annona montana,* and *Annona muricata.*

Types.—The types of *pomorum* and *maculicollis* are both in good condition. The specimen of *maculicollis* in the British Museum is labelled "Lectotype," however this designation has not been published and has no nomenclatural validity. We take the opportunity, therefore, to designate this specimen as lectotype.

Bephratelloides cubensis (Ashmead)
(Figs. 4, 6, 7, 11)

Bephrata cubensis Ashmead, 1894: 321, 3 ♀. Lectotype ♀, ANSP no. 4902 [examined].

Diagnosis.—Female length 4 to 9.5 mm. Body color dark brownish yellow to black, forewings usually with conspicuous mark-

ings posteriad of veins. Scutellum rounded apically (Fig. 11), arched in profile, and not projecting much beyond dorsellum (Fig. 4); propodeum medially (Fig. 6) with a smooth area or with irregular transverse carinae, without setigerous cells; forewing speculum absent, cubital vein with setae basally. Male flagellomeres cylindrical (Fig. 7), setae somewhat aligned in rows separated by distinct bare areas, longer than width of each segment.

This species is most similar to *pomorum* which is about the same size and color. However, *pomorum* has the apical margin of the scutellum excised (Fig. 12), the scutellum depressed in profile and extending notably beyond the dorsellum (Fig. 3), and the median propodeum with setigerous cells (Fig. 5).

Discussion.—As with *B. pomorum, cubensis* has a wide range of variation in size and coloration. Unlike *pomorum*, however, the abdomen does not seem to become horizontal in profile with a decrease in size.

Bephratelloides cubensis and *pomorum* are the two most commonly reared species of the genus. Based upon a study of over 300 specimens, we've noticed a difference in sex ratio between the species. Of 172 *cubensis* specimens only 4 per cent were males whereas of 164 *pomorum* specimens 37 per cent were males. According to Bruner and Acuna (1923) virgin *cubensis* females produce female progeny, and Hannah Nadel (pers. comm.) has told us that males of *cubensis* are "extremely rare" and female progeny are produced from unmated adult females. Thus *cubensis* is a thelytokous species.

Several fairly extensive papers have been published on the biology of *B. cubensis*. Bruner and Acuna (1923) published a review of this species and discussed its biology in Cuba. They included figures of the egg, larva, pupa, and adult as well as photos of larvae within the seeds of *Annona squamosa* and an adult ovipositing into fruit of *Annona reticulata*. Dozier (1932) redescribed the species, showed a photo of damaged fruit (*Annona reticulata*), and cited rearing records in Haiti. Osorio (1937) discussed and figured the immatures, adults, and damage to the fruit. Korytkowski and Ojeda Pena (1966) discuss the biology of the species in Peru on *Annona cherimola* and give numerous figures of morphology including ovipositor, head, mouthparts, wings, and legs.

Distribution.—We have seen 165 ♀ and 7 ♂ from the following localities: United States (Florida, Hawaii), Cuba, Haiti, Puerto Rico, Jamaica, Dominican Republic, Curacao, Mexico, Honduras, Guatemala, Costa Rica, Panama, Venezuela, Colombia. Peru is listed for this species by Korytkowski and Ojeda Pena (1966).

Hosts.—*Annona cherimola, A. muricata, A. reticulata,* and *A. squamosa*. DeSantis (1979) lists *A. bullata* as a host for this species but we have not been able to confirm this record. Nadel (pers. comm.) informs us that *A. glabra, A. montana,* and the commercial cultivar called "atemoya" (*A. squamosa* × *cherimola*) are hosts of *cubensis*.

Types.—Lectotype ♀ (present designation) on point, with data: Cuba. 175,167, Chalcis. *Bephrata cubensis* Ash. Type. Type no. 4902. Deposited in ANSP. The specimen is intact except for the right hindleg, which is missing. Paralectotype ♀ on minuten (USNM), the abdomen was apparently glued separately to a small block of balsa and subsequently lost. Otherwise, the specimen, although covered by dirt, is intact. Ashmead stated that this species was described from 3 ♀. The third specimen is apparently lost as we could not find it in either the USNM or ANSP collections.

Bephratelloides paraguayensis (Crawford)

(Figs. 2, 9, 13)

Bephrata paraguayensis Crawford, 1911: 274. Lectotype ♀, USNM type no. 13801 [examined].

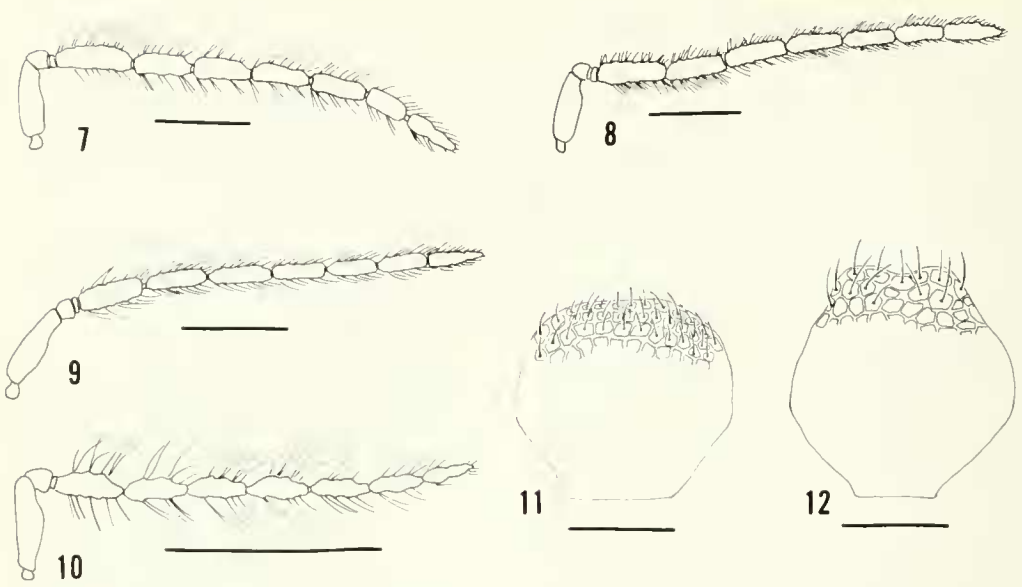

Plate 2. Figs. 7–12. *Bephratelloides* spp. 7, *cubensis* ♂ antenna. 8, *pomorum* ♂ antennae. 9, *paraguayensis* ♂ antenna. 10, *petiolatus* ♂ antenna. 11, *cubensis* ♀ scutellum, dorsal view. 12, *pomorum* ♀ scutellum, dorsal view. Scale line equals 0.5 mm.

Diagnosis.—Female length 5.0 mm. Body color orangish yellow, setigerous punctures under eye nearly contiguous (Fig. 2); scutellum not projecting much beyond the dorsellum, as long as wide, rounded apically; propodeum medially lightly sculptured, without setae along midpoint; forewing faintly darkened posteriad to marginal vein; wing speculum absent, cubital vein with setae basally (Fig. 13). Male flagellomeres cylindrical (Fig. 9), evenly covered with closely spaced, recurved setae.

This species is most similar to *petiolatus* n. sp. and methods to separate them are given under that species.

Distribution.—Paraguay.

Hosts.—*Annona* sp.

Types.—Lectotype female (present designation) on point with data: Paraguay, ex. seeds *Annona*, USNM type no. 13801. Paralectotypes: 3 ♀ and 2 ♂ with same data as lectotype. The antennae from one ♀ paralectotype has been slide mounted. The USNM collection also contains 3 unlabeled specimens of this species that may have been from the same series as the types.

Bephratelloides petiolatus Grissell and Schauff, New Species
(Figs. 1, 10, 14)

Diagnosis.—Length 3.1–3.5 mm. Body color orangish yellow, often with large areas of dark color on the dorsal head and thorax; malar space devoid of punctures (Fig. 1); forewing speculum present (i.e. asetose) and cubital vein basally without setae (Fig. 14); male flagellomeres (Fig. 10) somewhat spindle-shaped, with erect setae 2× as long as width of segment; abdominal petiole about 3× as long as wide.

Males of *petiolatus* may be separated from *paraguayensis* by the ventrally expanded scape (nearly cylindrical in *paraguayensis*, cf. Figs. 9, 10), the pedicellate flagellomeres with erect setae (cylindrical flagellomeres with recurved setae in *paraguayensis*), and the abdominal petiole 3× as long as broad (1.5× as long as broad in *paraguayensis*).

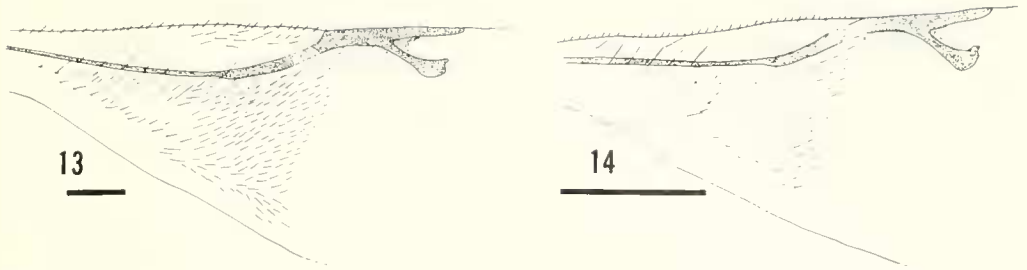

Plate 3. Figs. 13–14. *Bephratelloides* spp., basal forewings. 13, *paraguayensis* ♀. 14, *petiolatus* ♀. Scale line equals 0.5 mm.

Females are more difficult to separate, but *petiolatus* has a nearly smooth area below the eye (*paraguayensis* with scattered setigerous punctures, cf. Figs. 1, 2) and the cubital vein asetose basally (setose in *paraguayensis*, cf. Figs. 13, 14).

Description.—Female length 3.1–3.5 mm. Body color may be completely yellow but with dorsal thorax and abdomen often with large areas of dark brown or black. Head width, at level of eyes, 1.3× height; eye height 1.3× malar space; POL subequal to OOL (8:7); scrobes reaching slightly past midpoint of eye; with large area free of setigerous punctures below eye (Fig. 1); mesoscutum 1.7× length of pronotum (at anterior carina), equal to length of scutellum; pronotum with anterior carina nearly complete, interrupted medially for a length about equal to POL or slightly less; apical margin of scutellum transverse or slightly rounded, not indented; propodeum covered laterally by large irregularly margined punctures which gradually become less pronounced medially, median area covered by irregular transverse carinae, without setae, dorsally about as wide as dorsellum and becoming narrower posteriorly (at posterior margin only about ½ as wide as at anterior margin); petiole 2× as broad as long, dorsally with an upward projecting semicircular median carina; abdomen about equal in length to thorax, about 2× as long (lateral view) as wide (dorsal view), not arched medially; forewing hyaline, without a darkened spot beneath the marginal or stigmal veins, but with a whitish translucent area just below the marginal and adjacent to the stigmal (Fig. 14), speculum present, cubital vein without setae basally.

Male.—Similar to female except for following: generally darker in color with extensive darkened area on the vertex, dorsal thorax, and abdomen (all of the available males were about as dark as the darkest of the females); length 2.3–3.1 mm; antennae as in Fig. 10; abdominal petiole 3× as long as wide; abdomen only about 2× as long as petiole.

Distribution.—Panama.

Host.—Unknown.

Types.—Holotype ♀ on point with data: LaSabanas, Panama City [Panama], J. Zetek Collector. Z-2007. Apr. 9, 1923 (Deposited in USNM). Paratypes: 5 ♀ and 5 ♂ with same data as holotype. All in USNM except 1 ♀ and 1 ♂ in BMNH.

Etymology.—The species epithet refers to the elongate petiole of the males of this species.

Unrecognized Species of *Bephratelloides*

Bephratelloides limai (Bondar)

Prodecatoma limai Bondar, 1928: 83, ♀. Type apparently lost.

Bephrata limai (Bondar); Bondar, 1930: 106. **New Combination.**

Bephratelloides limai (Bondar); DeSantis, 1980: 245. **New Combination.**

Types.—Type material (at least one female) was collected in the state of Bahia, Brazil from seeds of "Anonacea." Attempts to locate this material have failed. According to the original description they should be located at the "Museu Nacional do Rio," but according to its curator, Miguel Monne, they are not there.

Discussion.—Bondar's original description of this species (1928) consists of little more than a general description of body color. He noted that the generally yellow colored body had a black spot or mark between the ocelli and at the foramen on the back of the head. In addition, the antennae were somewhat darker than the rest of the body with the second basal segment (pedicel) almost black and the wings were clear with the stigmal somewhat darkened.

Bondar stated that *limai* was reared from ". . . dementes de varias anonaceas" so there is little doubt that this species belongs in *Bephratelloides*. Its yellow color and 6 mm length would place it near *B. paraguayensis* but without specimens of *limai* we can't be certain of its identity. The problem could be readily resolved by rearing topotypic material from Bahia, Brazil from *Annona* seeds.

Bephratelloides melleus (Westwood), New Combination

Eurytoma mellea Westwood, 1874: 139 (Pl. XXVI, fig. 2), ♀. Type apparently lost.

Type.—This species was apparently described from a single female specimen (based upon a single measurement and figure 2, plate 26). It was reared in Para, Brazil from unknown fruit. The type cannot now be found either at the British Museum (NH) or Oxford Museum (Boucek, O'Toole pers. comm.).

Discussion.—In his discussion of this species, Westwood (1874) compared it to *Chalcis pomorum* (now = *Bephratelloides pomorum*), stating that the two were clearly congeneric. The colored figure of *melleus* also leaves little doubt that it is correctly placed as *Bephratelloides*. There is no doubt in our minds that *melleus* represents either *B. pomorum* or *B. cubensis*, but we cannot make a decision without seeing the type. If it is *pomorum* no nomenclatural problems would arise, but if it is *cubensis* then the name *melleus* would have priority and would replace one of the most commonly collected species of *Bephratelloides*.

Species Transferred from *Bephratelloides*

Bephratoides consobrinus (Girault), New Combination

Bephrata consobrina Girault, 1913a: 60, 1 ♂, San Bernardino, Paraguay. Holotype ♂, ZMHB, examined.

Bephratoides longigaster Subba Rao, 1978: 302–303, 6 ♀, 2 ♂, Nova Teutonia, Brazil. Holotype ♀, paratypes, BMNH; paratype ♀, USNM, examined. New Synonymy.

The male holotype of *Bephrata consobrina* Girault is in nearly perfect condition. Girault reported (1913a) that an "antenna and posterior leg" was mounted on a slide, but we have not seen this material. Based upon the deeply concave occiput, the carinate cheeks, the posteriorly constricted pronotum with tooth-like dorsal sculpturing, the swollen anterior femur with small teeth on the ventral margin, and the placement of the anterior ocellus (located in the scrobal cavity), there is no doubt that *consobrinus* should be placed in *Bephratoides* as defined by Burks (1971). Examination of a paratype female and a male from the type locality (determined by Subba Rao) of *Bephratoides longigaster* Subba Rao (1978) convinces us that it is synonymous with *consobrinus*. Not only is the single diagnostic character the same for both species, (i.e. face longitudinally striate vs. umbilicately punctate in the 4 other known species), but other structural characters such as the carinate scrobal basin, lamellate intercoxal shelf, wing venation, petiolar length and sculpturing, and propodeum are all the same. The distinct coloration is the same as well

(i.e. head yellow with vertex black, and thorax black with all legs including coxae and most of pronotum yellow).

Members of this genus are considered to be parasitic on wood-boring Coleoptera (Burks 1971, 1979).

Eurytoma giraulti Grissell & Schauff, New Name

Bephrata bicolor Girault, 1913a: 59–60, 1 ♀, San Bernardino, Paraguay. Holotype ♀, ZMHB [examined]. [Junior secondary homonym of *Eurytoma bicolor* Walsh, 1870: 298.]

Girault (1913a: 60) suggested that the specimen upon which this species was based might be the female of *Bephrata consobrina* (= *Bephratoides consobrinus*, see above) which was described in the same paper from a male specimen collected at the same locality. The specimens, which were collected four months apart, are remarkably similar in the distinctive color pattern of black and yellow, but other than this are not morphologically very similar. Major differences, generally considered of generic rank, include the following for *bicolor* (contrasting difference for *consobrinus* in parentheses): occiput shallowly concave (deeply concave), ocellus above the scrobal basin (in the basin), anterior femur without teeth on ventral margin (femur with teeth and slightly swollen), pronotum nearly parallel-sided and without enlarged punctures medially which have raised interstices (constricted posteriorly, with enlarged punctures medially which have raised interstices).

The transfer of *bicolor* from *Bephratelloides* is based upon the fact that it has 5 flagellomeres, a longitudinal carina on the outer edge of the forefemur from the base to the apex, and the mesosternum has a carinate shelf below the forecoxae. All of these characters are found in *Eurytoma* but not *Bephratelloides*. Walsh (1870) described *Eurytoma bicolor*, and transfer of *bicolor* Girault (1913a) to *Eurytoma* causes Girault's name to become a junior secondary homonym of Walsh's name. Therefore we must rename Girault's species and we do so in his honor.

Unfortunately the genus *Eurytoma* is not well defined and no natural system of classification exists within it. An examination of this problem is beyond the scope of this paper, but the structural modifications of the thorax found in *bicolor* and some species of *Eurytoma* (i.e. mesosternal shelf and forecoxae grooved for the reception of the head) may indicate a phylogenetically related group of species.

Eurytoma fulviscapus (Girault), New Combination

Bephrata fulviscapus Girault, 1913a: 59, 1 ♀, San Bernardino, Paraguay. Holotype ♀, ZMHB [examined].

The holotype is a typical *Eurytoma* with two outstanding features, namely the first flagellomere and the propodeum. The first flagellomere is tapered from base to apex (ratio of base width : apex width = 9:16), is 4 times longer than basal width (4:17), and is concolorus yellow with the scape and anellus. The propodeal furrow is a parallel-sided, narrow, deep channel which is bounded on either side by a flat, triangular, finely sculptured panel. The ratio of furrow : panel : overall propodeal width is approximately 5:12:65. At the dorsum of the furrow is a pair of pits each of which is flanked on its outer side by a slightly raised carina. Because there is no key to neotropical *Eurytoma*, and because there are a large number of species, it is virtually impossible to place *fulviscapus* without a complete study of the neotropical fauna.

Tetramesa aristidae (Risbec), New Combination

Bephrata aristidae Risbec, 1951: 356–359 (fig. 164), 17 ♀, 15 ♂, M'Bambey, Senegal. Syntypes, MNHN [examined].

We have seen five slide-well mounts (typical of Risbec) containing 23 females and 11 males reared from galls on *Aristida stipoides* (Stipeae: Graminales) from Bambey,

Senegal. Although these specimens are identified as *Bephrata aristidae* and they fit the correct host and locality data as given by Risbec they are not labeled as types of any kind. Selection of lectotype is left to the discretion of the next reviser of *Tetramesa*. This species is placed in *Tetramesa* based upon its lack of a post-genal lamella, the postmarginal and stigmal veins of equal length, the sloping propodeum with an indefinite median furrow, and the association with grass.

Tetramesa decaryi (Risbec), New Combination

Bephrata decaryi Risbec, 1952: 281–283, 1 ♂, Tananarive, Madagascar. Holotype ♂, MNHN [examined].

The male specimen, mounted on a card, is in perfect condition and is easily placed as a *Tetramesa* based upon the lack of a post-genal lamella, the elongate and erectly setose flagellomeres (in male), the absence of a distinct scrobal basin, the yellow markings on the sides of the pronotum, the postmarginal and stigmal veins of equal length, and a sloping propodeum with an indefinite median furrow.

Tetramesa tananarivensis (Risbec), New Combination

Bephrata tananarivensis Risbec, 1952: 284, 2 ♂, Tananarive, Madagascar. Syntypes, MNHN [examined].

The two males of this species are mounted on a single card and are in good condition. They are easily placed as *Tetramesa* for the reasons given under *T. decaryi*. Selection of lectotype is left to the discretion of the next reviser of this genus.

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Literature Cited

Ashmead, W. H. 1894. Descriptions of new parasitic Hymenoptera. Trans. Amer. Entomol. Soc. 21: 318–344.

Bondar, G. 1928. Uma nova especie de Hymenoptero nas sementes de Anonacea. Bol. Biol. Lab. Parasit. São Paulo 13: 83–84.

Bondar, G. 1930. Contribucão para o conhecimento do Hymenopteros phytophagos Calcidoideos. Bol. Mus. Nac. Rio de Jan. 6: 111–117.

Brues, C. T. 1908. Notes and descriptions of North American parasitic Hymenoptera. VII. Wisconsin Nat. Hist. Soc. Bull. 6: 154–163.

Bruner, S. C. and J. Acuna. 1923. Sobre la biologia de *Bephrata cubensis*, Ashm., el insecto perforador de las frutas anonaceas. Rev. Agric. Comer. Trab. 5(7): 21–30. (An unchanged reprint of this paper was published in 1967 by Academia de Ciencias de Cuba, Instituto de Agronomia, as Serie Agricola No. 1: 1–14.)

Burks, B. D. 1971. A synopsis of the genera of the family Eurytomidae. Trans. Amer. Entomol. Soc. 97: 1–89.

———. 1979. Family Eurytomidae, pp. 835–860. *In*

K. V. Krombein et al., eds., Catalog of Hymenoptera of America North of Mexico, Vol. 1. Symphyta and Apocrita (Parasitica). Smithsonian Institution Press, Washington, D.C., 1198 pp.

Cameron, P. 1884. Biologia Centrali-Americana. Hymenoptera 1: 81–144.

———. 1913. The Hymenoptera of the Georgetown Museum. Part 5. Timehri, J. R. Agr. Com. Soc. Br. Guiana (3) 3: 105–137.

Crawford, J. C. 1911. Descriptions of new Hymenoptera. 3. Proc. U.S. Natl. Mus. 41: 267–282.

DeSantis, L. 1979. Catalogo de los Himenopteros Chalcidoideos de America al sur de los Estados Unidos. Com. Invest. Cien. Prov. Buenos Aires, Publ. Especial., La Plata. 488 pp.

———. 1980. Catalogo de los Himenopteros Brasilenos de la Serie Parasitica Incluyendo Bethyloidea. Editora da Universidade Federal do Parana, Curitiba. 395 pp.

Dominguez Gil, O. E. 1980. Insectos perjudiciales de la Guanabana (*Annona muricata* L.) en el estado Zulia, Venezuela. Rev. Latinoamericana de Ciencias Agr. 15: 43–55.

Dozier, H. L. 1932. Two important West Indian seed-infesting Chalcid wasps. J. Dept. Agr. Puerto Rico 16: 103–112.

Fabricius, J. C. 1804. Systema Piezatorum secudum ordines, genera, species, adjectis synonymis, locis, observationibus, descriptionibus. Braunschweig, 439 pp. (+30 pp. index).

Girault, A. A. 1913a. More new genera and species of Chalcidoid Hymenoptera from Paraguay. Arch. Natur. 6: 51–69.

———. 1913b. Three new genera of Chalcidoid Hymenoptera from Queensland. Ent. News 24: 457–460.

Heu, R. 1988. *Bephratelloides* (=Bephrata) *cubensis*. In minutes, notes, and exhibitions, February. Proc. Hawaiian Entomol. Soc. 28: 4.

Korytkowski, G. and D. Ojeda Pena. 1966. *Bephrata cubensis* Ashmead (Hym.: Eurytomidae), una nueva Especie Dañina a las Anonáceas en el Peru. Rev. Per. de Entomol. 9: 56–60.

Osorio, J. M. 1937. El Insecto que perfora los frutos de las Anonaceas. Rev. de Agric. (Havana) 2: 10–19.

Palmer, E. and N. Pitman. 1972. Trees of southern Africa. A. A. Balkema, Cape Town, South Africa. 2235 pp.

Risbec, J. 1951. Les Chalcidoides d'A. O. F. Mem. Inst. Fran. d'Afr. Noire 13: 1–409.

———. 1952. Contribution a l'etude des Chalcidoides de Madagascar. Mem. de l'Inst. Scien. de Madagascar. Ser. 3. (II): 1–449.

Subba Rao, B. R. 1978. New genera and species of Eurytomidae. Proc. Indian Acad. Sci. (B) 87: 293–319.

Walsh, B. D. 1870. The group Eurytomides of the hymenopterous family Chalcididae. Amer. Entomol. and Bot. 2: 297–301.

Westwood, J. O. 1874. Thesaurus entomologicus Oxoniensis. Oxford, xiv + 205 pp., 40 pls.